Xerox File No. A2019-US-NP

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Confirmation No.: 3957
Applicant: Paul A. Hosier et al	Group Art Unit: 2622
Application No. 10/762,120	Examiner: Albert H. Cutler
Filed: 1/21/2004	
Title: IMAGE SENSOR ARRAY WITH VARIABLE RESOLUTION AND HIGH-SPEED OUTPUT	Customer No.: 25453

Sir:

APPEAL BRIEF PURSUANT TO 37 C.F.R. 1.192

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APPELLANT'S BRIEF ON APPEAL

Appellants hereby appeal to the Board of Patent Appeals and Interferences from the Examiner's Final Rejection of claims 8-10 and 13-18, which was contained in the Office Action mailed 3/5/2008.

A timely Notice of Appeal was filed 6/5/2008.

Real Party In Interest

Xerox Corporation is the real party in interest.

Related Appeals And Interferences

No appeals or interferences are known which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

Status Of The Claims

Appendix I provides a clean, double-spaced copy of the claims on appeal.

Claims 1-7 and 11-12 are cancelled.

Claims 8-10 and 13-18 are on appeal.

Claim 8 is independent, and claims 9-10, 13 and 14 are dependent therefrom; claim 15 is independent, and claims 16-18 are dependent therefrom.

Status Of Amendments

No Amendments have been filed since the Final Rejection.

Summary of Claimed Subject Matter

The present invention relates to photosensor arrays, such as used in digital cameras, or, with most relevance to the present invention, scanners used in office equipment such as digital copiers and facsimile machines. In such scanners, a sheet having an image to be recorded is moved past a substantially linear array of very small photosensors. As a series of small areas of the sheet move past each photosensor, the photosensor outputs a series of signals. The

outputs of all the photosensors for a scanned page are ultimately converted into digital image data for the whole page image.

The present invention is directed to a scanner capable of scanning data at **two different spatial resolutions**. At one selected high resolution in a practical embodiment, the output of *every single photosensor* in a linear array is read out across the array. If a low spatial resolution is selected, groups of photosensors along the array are effectively bunched, so that a group of, for instance, four photosensors act as one large photosensor. (For various reasons, it is sometimes desirable to scan at a relatively low resolution, such as to conserve data bandwidth.) In the low-resolution mode, the outputs of a series of *groups* of photosensors are read out, as though each group (for instance, of four photosensors) were a single large photosensor.

The below annotated version of Figure 2 as filed shows, in the embodiment, how, in the first mode, a group of four photosensors, such as 12a, 12b, 12c, 12d, can be caused to operate as a single photosensor,such as indicated as 10; and in a second mode, individual photosensors such as 12a and 12b *within* each group can independently output signals to output lines such as V_{ido} and V_{ide} in Figure 2, for a high-resolution output. Thus, in the first mode (as recited in the claims), a group of four photosensors are electrically tied together to form a single low-resolution photosensor such as 10; whereas in the second or high-resolution mode, each individual photosensor such as 12a or 12b functions independently.

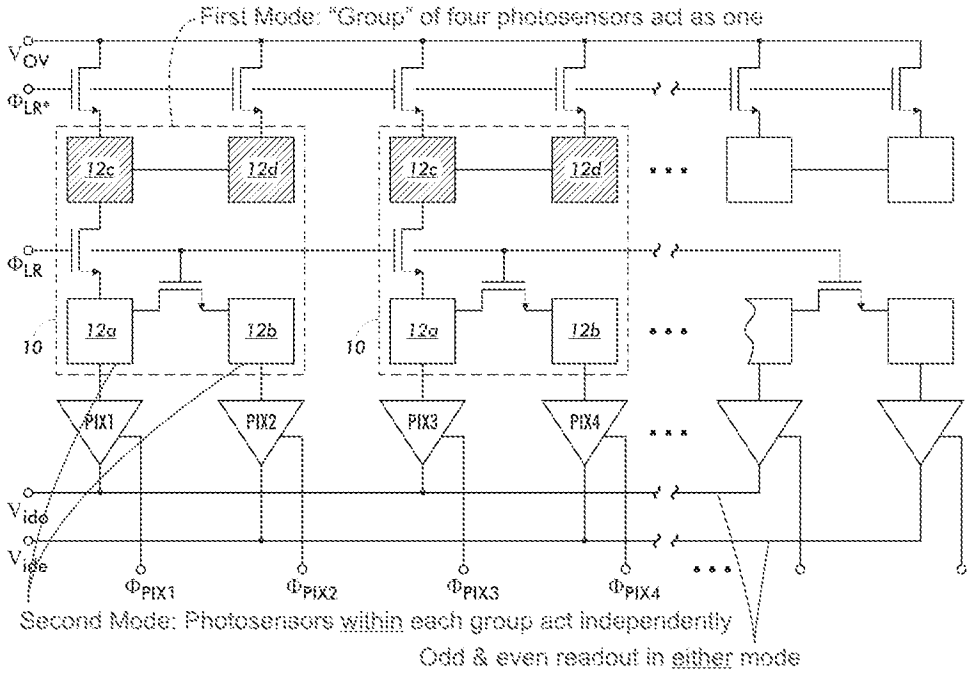

FIG. 2

Another recited aspect of the claimed invention is the presence and use of **two** parallel output lines, shown in the above figure as V_{ido} (odd) and V_{ide} (even). When signals are read out from photosensors along the array, the outputs from each "odd" photosensor such as 12a above overlap over time with outputs from an adjacent "even" photosensor such as 12b. As can be seen in the Figure, the odd photosensors 12a are associated with odd line V_{ido} and the even photosensors 12b are associated with even line V_{ide}. (As described in the claims, the odd and even photosensors or groups of photosensors are "interleaved.") By overlapping odd and even trains of signals over time over separate odd and even output lines, the overall readout time of the array is significantly shortened.

As recited in each independent claim 8 and 15, and as explained in the Specification as filed at paragraph 0025, the two-line, odd-even readout arrangement **remains in place** in **either mode.** That is, when either *groups* of photosensors 10 (in the low-resolution mode), or *individual* photosensors 12a or

12b *within* each group 10 (in the high-resolution mode) are read out, the outputs go to odd and even lines respectively and the odd-even overlap of signals on the two output lines still takes place. **This** capability is captured by the last clause of claim 8 and claim 15, and is not remotely suggested by either reference.

So, taking independent claim 8, the aspects of the claimed invention of interest to this Appeal are as follows:

> 8. A method of operating an imaging apparatus, the apparatus including a plurality of groups of photosensors, wherein a first subset of groups of photosensors is substantially evenly distributed along a linear array and is substantially **interleaved** with the second subset of groups of photosensors along the linear array, a first output line, and a second output line [V_{ido} (odd) and V_{ide} (even) in Figure 2 above], comprising:
>
> in a first [low-resolution] mode, transferring signals from a first subset of **groups** of photosensors to the first output line, and transferring signals from a second subset of groups of photosensors to the second output line [each **group**, such as of four photosensors, is shown as 10 in Figure 2 above]; and
>
> in a second [high-resolution] mode, for each of a plurality of groups of photosensors, transferring signals from a **first photosensor in the group** [such as photosensor 12a] to the first output line [V_{ido}], and transferring signals from a **second photosensor in the group** [such as photosensor 12b] to the second output line [V_{ide}];
>
> wherein, in the first mode or the second mode, signals from **adjacent photosensors or groups of photosensors** [the odd-even arrangement] on the first and second output lines **overlap over time** [this is the **two-line** readout system; it is evident in **both** high and low resolution modes].

Claim 15 can be similarly parsed:

15. An imaging apparatus, comprising:

an odd output line [Vido] for conveying odd video signals;

an even output line [Vide] for conveying even video signals; and

a plurality of groups [10] of photosensors, the groups being arranged in odd and even positions along a linear array;

the photosensors in each group [12a, 12b, 12c, 12d] being connectable in a first mode [i.e., low-resolution] to output a single video signal for the group, with the groups in odd positions outputting to the odd video line and the groups in even positions outputting to the even video line;

the photosensors in each group being connectable in a second mode whereby a first photosensor in the group [12a] outputs to the odd video line and a second photosensor in the group [12b] outputs to the even video line; and

means for reading out signals in the first mode or the second mode, wherein signals from adjacent photosensors or groups of photosensors on the first and second output lines overlap over time.

Grounds of Rejection to be Reviewed

The following issues are presented for review by the Board of Patent Appeals and Interferences:

1. Whether claims 8-10, 13 and 14 are rejected under 35 USC 103(a) over Moraillon in view of Stark.

2. Whether claims 15-18 are rejected under 35 USC 103(a) over Stark in view of Moraillon.

Argument

In the Final Office Action, claims 8-10, 13 and 14 are rejected under 35 USC 103(a) over Moraillon in view of Stark. All of the claims in this rejection are ultimately dependent from claim 8. Further, claims 15-18 are rejected under 35 USC 103(a) over Stark in view of Moraillon. All of the claims in this rejection are ultimately dependent from claim 15.

Each independent claim 8 and 15 recites that two *subsets of groups* of photosensors (in Figure 2, for example, each group 10 of photosensors includes photosensors 12a, 12b, 12c, 12d) are interleaved along a linear array. Further as recited in claim 8 and claim 15, in the first mode or the second mode, **signals from adjacent photosensors or groups of photosensors on the first and second output lines overlap over time.** By this is meant the apparatus outputs at least two "trains" of signals, corresponding to adjacent "odd" or "even" photosensors 12 or groups of photosensors 10. As explained in the Specification as filed at paragraph 0025, with the claimed invention, the two-line, odd-even arrangement **remains in place** in **either mode**, when either *groups* of photosensors 10, or *individual* photosensors 12 *within* each group 10, are read out. **This** capability is captured by the last clause of claim 8 and claim 15, and is not remotely suggested by either reference.

Turning to the Moraillon reference, there is a general discussion of an upper register 12 and a lower register 13 operative of a two-dimensional CCD. While the respective columns of CCD photosite locations are arguably "odd" and "even," there is no disclosure or suggestion in the reference of the idea of being able to change the effective resolution of the apparatus, such as with the photosensors and groups of photosensors of the claimed invention. As pointed out in the rejection, Moraillon does not teach the "first and second modes," as recited in claims 8 and 15; and so there is no teaching or suggestion anywhere in the cited art of switching between reading out individual photosensors or groups of photosensors.

Turning to the Stark reference, the most relevant teaching is at paragraphs 0090 to 0095, a discussion of the "interlace mode." It is clear that the interlace mode of Stark is not the same as the "two-line, odd-even" arrangement of the claim. While Stark uses the odd-even language, Stark is really talking about taking two *complete*, but half-resolution, pictures ("frames" or "fields") of an image; and reading out *all* of one picture *and then* reading out *all* of the other picture. See paragraphs 0095-0096 of Stark (emphases added):

> For the odd field, the charges from two vertically adjacent unit cells 40 and 42 in lines R1 and R2 are combined (as noted by the dashed box around them) and simultaneously transferred to the sense amplifier for that column, SA_1, in a manner similar to that described with respect to FIG. 1. This is true for all unit cells in lines R1 and R2 …. This is followed by a similar action for lines R3 and R4, followed by lines R5 and R6, and so on, until the last two lines. * * * [0096] **The odd field readout is followed by the readout of the even field.** The even field data *acquisition* [i.e., "taking the picture," NOT the *readout* of the signals] is generally simultaneous with the odd field *readout.*

In Stark, the entire *field* of odd data is read out separately from reading out the entire field of even data. This is simply not the same as reading out signals from adjacent odd and even photosensors, *one pixel at a time,* so that signals from adjacent (odd, then even) photosensors or groups of photosensors **overlap over time**, as recited in claim 8 or claim 15.

Each independent claim 8 and 15 recites that, in a first mode, groups of photosensors read out signals as **groups** onto odd and even lines, and, in a second mode, individual photosensors within a group read out signals onto odd and even lines. Regardless of how the teachings of references are combined, neither Moraillon nor Stark disclose or remotely suggest this capability. Therefore, independent claims 8 and 15 are allowable, along with their respective dependent claims.

Summary

Claimed invention: Photosensors can read out individually, or in groups. There are two output lines, for reading out signals from odd and even photosensors (**or** groups of photosensors) simultaneously. The odd/even readout system works in either mode.

Moraillon: photosite locations are arguably "odd" and "even," but no disclosure or suggestion of being able to change the effective resolution of the apparatus.

Stark: teaches taking two *complete*, but half-resolution, pictures of an image; and reading out *all* of one picture *and then* reading out *all* of the other picture; this is different from the odd/even, "overlapping over time" readout of the invention.

What is missing from either reference: idea of being able to "group" photosensors for low-resolution mode; odd-even readout of signals in either resolution mode.

Conclusion

For the above reasons, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejection by the Examiner and mandate the allowance of Claims 8-10 and 13-18.

Respectfully submitted,

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Appendix I - Claims on Appeal

1. – 7. **(CANCELLED)**

8. **(PREVIOUSLY PRESENTED)** A method of operating an imaging apparatus, the apparatus including a plurality of groups of photosensors, wherein a first subset of groups of photosensors is substantially evenly distributed along a linear array and is substantially interleaved with the second subset of groups of photosensors along the linear array, a first output line, and a second output line, comprising:

in a first mode, transferring signals from a first subset of groups of photosensors to the first output line, and transferring signals from a second subset of groups of photosensors to the second output line; and

in a second mode, for each of a plurality of groups of photosensors, transferring signals from a first photosensor in the group to the first output line, and transferring signals from a second photosensor in the group to the second output line;

wherein, in the first mode or the second mode, signals from adjacent photosensors or groups of photosensors on the first and second output lines overlap over time.

9. **(ORIGINAL)** The method of claim 8, wherein the first mode corresponds to a low-resolution operation and the second mode corresponds to a high-resolution operation.

10. **(ORIGINAL)** The method of claim 8, further comprising

in the first mode, effectively connecting at least two photosensors in the group to form a single photosensor.

11. **(CANCELLED)**

12. **(CANCELLED)**

13. **(ORIGINAL)** The method of claim 8, wherein the apparatus includes a shift register having a plurality of stages, and each of at least two photosensors within a group is associated with a shift register stage.

14. **(ORIGINAL)** The method of claim 13, further comprising

in the first mode, operating the shift register so that, for a plurality of groups of photosensors, only one shift register stage effectively operates the group.

15. **(PREVIOUSLY PRESENTED)** An imaging apparatus, comprising:

an odd output line for conveying odd video signals;

an even output line for conveying even video signals; and

a plurality of groups of photosensors, the groups being arranged in odd and even positions along a linear array;

the photosensors in each group being connectable in a first mode to output a single video signal for the group, with the groups in odd positions outputting to the odd video line and the groups in even positions outputting to the even video line;

the photosensors in each group being connectable in a second mode whereby a first photosensor in the group outputs to the odd video line and a second photosensor in the group outputs to the even video line; and

means for reading out signals in the first mode or the second mode, wherein signals from adjacent photosensors or groups of photosensors on the first and second output lines overlap over time.

16. (**PREVIOUSLY PRESENTED**) The apparatus of claim 15, the first photosensor in each group and the second photosensor in each group being arranged along the linear array.

17. (**PREVIOUSLY PRESENTED**) The apparatus of claim 15, each group of photosensors further including a third photosensor and a fourth photosensor.

18. **(PREVIOUSLY PRESENTED)** The apparatus of claim 15, the photosensors in each group forming a two-dimensional array.

Appendix II - Evidence

NONE

Appendix III – Related Proceedings

NONE